L25 ANSWER 1 OF 32 CA COPYRIGHT 2002 ACS
AN 136:162639 CA
TI ***Insecticide*** resistance in increasing interest
AU Lee, Sung-Eun; Kim, Jang-Eok; Lee, Hoi-Seon
CS Research Center for Industrial Development of Biofood Materials and Institute of Agricultural & Technology, College of Agriculture, Chonbuk National University, Jeonju, 561-756, S. Korea
SO Agricultural Chemistry and Biotechnology (English Edition) (2001), 44(3), 105-112
CODEN: ACBTFF; ISSN: 1229-2737
PB Korean Society of Agricultural Chemistry and Biotechnology
DT Journal; ***General Review***
LA ***English***
AB A review. Insect pests can be controlled through direct application of insecticides. Insect control by residual protectants is relatively inexpensive and has an advantage of destroying all stages of infestations. The efficacy of control is largely detd. by the concn. of insecticides to which the pest species is exposed. A redn. in the period of control in the field afforded by a specific level of a protectant indicates that resistance has developed. An increase in the level of protectant is required to maintain control, and the efficacy of currently used insecticides has been severely reduced by insecticide resistance in pest species. Development of resistance to particular insecticide varies with species because insecticide resistance is often correlated with increased levels of certain enzymes, which are cytochrome P 450-dependent monooxygenases, glutathione S-transferases and ***esterases*** . Some sections of insecticide mols. can be modified by one or more of these primary enzymes. A redn. in the sensitivity of the action site of a xenobiotic also constitutes a mechanism of resistance. Acetylcholinesterase is a major target site for insecticide action, as are axonal sodium ion channels and .gamma.-aminobutyric acid receptors. Development of reduced sensitivity of these target sites to insecticides usually occurs. This review not only may contribute to a better understanding of insecticide resistance, but also illustrates the gaps still present for a full biochem. understanding of the resistance.
RE.CNT 54 THERE ARE 54 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 2 OF 32 CA COPYRIGHT 2002 ACS
AN 135:268696 CA
TI ***Insecticide*** resistance and its management in Helicoverpa armigera (Lepidoptera: Noctuidae) in India
AU Russell, Derek A.
CS Natural Resources Institute, Kent, ME4 4TB, UK

SO Indian Journal of Plant Protection (1999), 27(1 & 2), 32-46
CODEN: IPLPDQ; ISSN: 0253-4355
PB Plant Protection Association of India
DT Journal; ***General Review***
LA ***English***
AB A review with 40 refs. of advances in our understanding of the scale and biochem. of insecticide resistance in Helicoverpa armigera. Mapping of the resistance and its temporal dynamics within and between seasons has been carried out over four years for representative pyrethroids, organophosphates and a cyclodiene. Examn. of this data has prompted a no. of novel ecol. and biochem. studies aimed at elucidating the nature of the changes and the reasons for them. Synergist bioassays and biochem. assays have shown pyrethroid resistance to be mediated through metabolic insensitivity, enhanced circular impermeability, and target site insensitivity. Resistance to organophosphates is through insensitive acetylcholine ***esterases*** and enhanced ***esterases*** . An ***esterase*** dot blot assay has been developed which can be used to rapidly identify resistance mechanisms as well as frequency in large samples. Seasonal shifts in the prevalence of particular mechanisms have now been recorded and in some cases the specific isoenzymes responsible for resistance have been identified. A no. of effective synergists have been identified. In addn. to std. Integrated Resistance Management (IRM) principles, a no. of specific recommendations on the best use of insecticides in common use within India have been generated. These are being incorporated into farmer participatory IRM demonstrations in four states with initial results suggesting that spray costs can be reduced by at least 40% with no redn. in yield in all areas.
RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 3 OF 32 CA COPYRIGHT 2002 ACS
AN 135:73972 CA
TI Proteinase inhibitors: Plant-derived genes of ***insecticidal*** protein for developing insect-resistant transgenic plants
AU Ussuf, K. K.; Laxmi, N. H.; Mitra, R.
CS Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Mumbai, 400 085, India
SO Current Science (2001), 80(7), 847-853
CODEN: CUSCAM; ISSN: 0011-3891
PB Current Science Association
DT Journal; ***General Review***
LA ***English***
AB A review with 105 refs. Proteinase inhibitors (PIs) are anti-metabolic proteins that interfere with the digestive process of insects. It is one of the important defense strategies existing in plants against predators.

The use of the plant-derived PI genes for developing insect-resistant transgenic crops has come of age. Several transgenic plants expressing PIs have been created and these plants have shown enhanced resistance against insect pests. Recently PIs have also been used to engineer resistance against viruses in transgenic plants. The current scenario for developing insect, fungal and viral pathogen-resistant transgenic crops by using PI gene(s) is reviewed. The biosafety aspect of the transgenic plants expressing PIs is also discussed.

RE.CNT 105 THERE ARE 105 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 4 OF 32 CA COPYRIGHT 2002 ACS
AN 134:262208 CA
TI Evolution of amplified ***esterase*** genes as a mode of ***insecticide*** resistance in aphids
AU Field, L. M.; Blackman, R. L.; Devonshire, A. L.
CS IACR-Rothamsted, Harpenden, AL5 2JQ, UK
SO Biochemical Sites of Insecticide Action and Resistance (2001), 209-219. Editor(s): Ishaaya, Isaac. Publisher: Springer-Verlag, Berlin, Germany. CODEN: 69AZEE
DT Conference; ***General Review***
LA ***English***
AB A review with many refs. on ***esterase*** -based resistance in Myzus persicae, mol. genetics of ***esterase*** overprodn., ***esterase*** genes in susceptible aphids, organization of susceptible ***esterase*** genes, cytogenetic studies of amplified ***esterases*** and expression of ***esterase*** genes.
RE.CNT 40 THERE ARE 40 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 5 OF 32 CA COPYRIGHT 2002 ACS
AN 134:1527 CA
TI The molecular basis of two contrasting metabolic mechanisms of ***insecticide*** resistance
AU Hemingway, J.
CS Cardiff School of Biosciences, Cardiff University, Cardiff, CF1 3TL, UK
SO Insect Biochemistry and Molecular Biology (2000), 30(11), 1009-1015 CODEN: IBMBES; ISSN: 0965-1748
PB Elsevier Science Ltd.
DT Journal; ***General Review***
LA ***English***
AB A review with 46 refs. The ***esterase*** -based insecticide resistance mechanisms characterized to date predominantly involve elevation of activity through gene amplification allowing increased levels of insecticide sequestration, or point mutations within the

esterase structural genes which change their substrate specificity. The amplified ***esterases*** are subject to various types of gene regulation in different insect species. In contrast, elevation of glutathione S-transferase activity involves upregulation of multiple enzymes belonging to one or more glutathione S-transferase classes or more rarely upregulation of a single enzyme. There is no evidence of insecticide resistance assocd. with gene amplification in this enzyme class. The biochem. and mol. basis of these two metabolically-based insecticide resistance mechanisms is reviewed.

RE.CNT 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 6 OF 32 CA COPYRIGHT 2002 ACS
AN 133:306379 CA
TI Organophosphorus ***insecticide*** poisoning
AU Karalliedde, Lakshman; Senanayake, Nimal
CS Med. Toxicol. Unit, Guy's & St. Thomas Hospitals, London, UK
SO eJIFCC [online computer file] (1999), 11(2), No pp. Given
CODEN: EJFCF9
URL: http://194.79.144.120/eJIFCC/vol11no2/pdf/Organophosphate_Article.pdf
PB International Federation of Clinical Chemistry and Laboratory Medicine
DT Journal; ***General Review*** ; (online computer file)
LA ***English***
AB A review and discussion with many refs. Organophosphorus insecticide poisoning is a major global health problem with approx. 3 million poisonings and 200,000 deaths annually. These irreversible inhibitors of acetylcholinesterase produce a well established triphasic effect in man. The initial cholinergic phase due to accumulation of acetylcholine at muscarinic, nicotinic, and central nervous system synapses is a medical emergency that often requires treatment in an intensive care unit. The intermediate syndrome sets in 2-4 days after initial exposure, due to pre- and post-synaptic dysfunction at the neuromuscular junction, and causes respiratory failure for which ventilatory care is necessary. The delayed polyneuropathy sets in about 21 days after exposure, due to phosphorylation of neuropathy target ***esterase*** , and produces sym. motor weakness of peripheral muscles with a variable sensory component. The organophosphorus compds. are known to produce effects on the nervous, cardiovascular, and reproductive systems in man and animals, producing a wide range of effects. Further interference with temp. regulation, metabolic and endocrine function along with disturbances in vision affection of vocal cords, and immunity could present challenging medical scenarios for a clinician. Biochem. assays of cholinesterase and organophosphorus agents have undergone considerable review, and progress is being made to develop scientifically reliable criteria for diagnosis and management. Atropine and pralidoximes have been the major therapeutic

agents for intoxication, but the unacceptable mortality and morbidity assocd. with poisoning necessitates change and the use of agents like clonidine and fluoride, which have potentially beneficial effects. There is need for collaborative research and study between the technol. developed countries and the third-world countries, where the vast majority of health disorders assocd. with organophosphorus insecticides is encountered.

RE.CNT 67 THERE ARE 67 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 7 OF 32 CA COPYRIGHT 2002 ACS
AN 133:39407 CA
TI The role of ***esterases*** in ***insecticide*** resistance
AU Devorshak, Christina; Roe, R. Michael
CS Department of Entomology, North Carolina State University, Raleigh, NC, 27695-7647, USA
SO Reviews in Toxicology (Amsterdam) (1998), 2(7,8), 501-537
CODEN: RETOFJ; ISSN: 1382-6980
PB IOS Press
DT Journal; ***General Review***
LA ***English***
AB A review with 184 refs. ***Esterases*** are a large, heterogeneous group of enzymes metabolizing a variety of exogenous and endogenous substrates with ester linkages. Traditionally, ***esterases*** have been arbitrarily classified in the literature by their ability to metabolize artificial or endogenous substrates or by their electrophoretic characteristics under non-standardized conditions. The lack of a mol. approach to ***esterase*** classification has and will continue to be the single most important factor preventing progress in understanding probably the most diverse group of xenobiotic metabolizing enzymes in nature. The level of insect ***esterase*** activity is highly variable depending on the life stage, sex, tissue, hormones, strain, food, food quality, environmental conditions and numerous other factors. ***Esterases*** have been assocd. with insecticide resistance in over 50 species of insects, ticks and mites. The functional roles of ***esterases*** in pesticide resistance are xenobiotic metab. and sequestration. Recent advances in the use of transition state analog chem. to characterize insect ***esterase*** structure and function promises new, easier methods for ***esterase*** purifn. and for examg. in vivo function. ***Esterases*** have also been used successfully in numerous cases as a marker for detecting insecticide resistance. Further studies are needed on the mol. biol. of ***esterases*** and the evolution of ***esterase*** -mediated insecticide resistance that will have a practical importance to the management of resistance in the context of integrated pest management.

RE.CNT 184 THERE ARE 184 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 8 OF 32 CA COPYRIGHT 2002 ACS
AN 131:318874 CA
TI ***Protease*** interactions with Bacillus thuringiensis ***insecticidal*** toxins
AU Oppert, Brenda
CS Grain Marketing and Production Research Center, Manhattan, KS, 66502, USA
SO Archives of Insect Biochemistry and Physiology (1999), 42(1), 1-12
CODEN: AIBPEA; ISSN: 0739-4462
PB Wiley-Liss, Inc.
DT Journal; ***General Review***
LA ***English***
AB A review with 102 refs. The microbe Bacillus thuringiensis (Bt) produces crystals that contain insecticidal crystal proteins (ICPs) used to control many major pests. ICPs are degraded by ***proteases*** from a variety of sources, including those endogenous to the bacterium, those purified from animals and plants, or those found in insects. ***Proteases*** in the bacterium function in protein metab. during sporulation; in some cases they hydrolyze ICPs. Insect ***proteases*** are implicated in Bt toxin specificity, mode of action and insect adaptation to Bt. This review describes the current knowledge of ***protease*** interactions with ICPs with special emphasis on the role of ***proteases*** in insect resistance to Bt toxins.
RE.CNT 93 THERE ARE 93 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 9 OF 32 CA COPYRIGHT 2002 ACS
AN 131:195698 CA
TI Intracellular ***proteases*** : their role in ***insecticide*** toxicity and resistance mechanisms
AU Wilkins, R. M.; Ahmed, S.; Mantle, D.
CS Department of Agricultural and Environmental Science, Newcastle University, Newcastle upon Tyne, NE1 7RU, UK
SO Brighton Crop Protection Conference--Pests and Diseases (1998), (vol. 2), 511-516
CODEN: BCPDED; ISSN: 0955-1506
PB British Crop Protection Council
DT Journal; ***General Review***
LA ***English***
AB A review with 13 refs. Protein metab. constitutes a major physiol. resource that can act as a compensatory mechanism under pesticidal stress. The degrdn. products of intracellular protein can be reutilized in protecting the cell from stress. Recently, high intracellular

protease activities have been found in a malathion-resistant strain of adults of Musca domestica L. These ***proteases*** are assocd. with tissues other than the gut and are responsible for metabolic processes of fundamental importance other than dietary protein digestion. Advantages an insecticide resistant strain can have from this adaptive aspect of protein metab. are suggested.

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 10 OF 32 CA COPYRIGHT 2002 ACS
AN 129:185371 CA
TI ***Insecticide*** resistance and its underlying mechanisms in the German cockroach, Blattella germanica (Linn.) (Dictyoptera: Blattellidae)
AU Lee, Chow-Yang
CS School of Biological Sciences, Universiti Sains Malaysia, Penang, 11800, Malay.
SO Journal of Bioscience (Penang, Malaysia) (1997), 8(2), 156-172
CODEN: JOBIES; ISSN: 0128-4541
PB Universiti Sains Malaysia
DT Journal; ***General Review***
LA ***English***
AB A review with many refs. on German cockroach resistance to insecticides since 1952, with emphasis on resistance mechanisms (reduced cuticular penetration, monooxygenase, ***esterase*** , glutathione S-transferase, altered acetylcholinesterase and kdr-type resistance) that had been reported. Each resistance mechanisms is discussed with emphasis on cases reported for German cockroaches. A short summary on several priority research areas that warrants further studies is also included.

L25 ANSWER 11 OF 32 CA COPYRIGHT 2002 ACS
AN 128:267152 CA
TI Biochemical synthesis of several chiral ***insecticide*** intermediates and mechanisms of action of relevant enzymes
AU Hirohara, Hideo; Nishizawa, Masako
CS Department of Materials Science, The University of Shiga Prefecture, Hikone, 522, Japan
SO Bioscience, Biotechnology, and Biochemistry (1998), 62(1), 1-9
CODEN: BBBIEJ; ISSN: 0916-8451
PB Japan Society for Bioscience, Biotechnology, and Agrochemistry
DT Journal; ***General Review***
LA ***English***
AB A review with .apprx.70 refs. Efficient biochem. processes were developed for the synthesis of several chiral alc. and acid intermediates of insecticides by a combination of strictly stereoselective hydrolytic enzyme-catalyzed reactions and subsequent chem. transformations with

inversion or racemization of the chiral center of the undesired antipodes. The whole amts. of starting racemic mixts. are converted to desired stereoisomers in the processes, which are generally applicable to the industrial productions of various chiral secondary alcs. and .alpha.-substituted acids once a highly stereospecific enzyme is obtained for the target compds. The alcs. reported here are: 1-(4-phenoxyphenoxy)-2-propanol, 1; 4-hydroxy-3-methyl-2-(2'-propynyl)-2-cyclopentenone, 2; and .alpha.-cyano-3-phenoxybenzyl alc., 3. The acids are 2, 2-dimethyl-3-(2-methyl-1-propenyl)-cyclopropanecarboxylic acid (chrysanthemic acid), 4; and 2-(4-chlorophenyl)-3-methylbutyric acid, 5. In addn., the mechanism of action of Pseudomonas cepacia lipase (PCL), the most effective enzyme for the resoln. of 1, and the recombinant Arthrobacter globiformis ***esterase*** (AES) for 4, was studied from the reaction kinetics. The site-directed mutagenesis techniques were also used for AES. The results indicated that the stereoselectivity of PCL is caused by the position and direction of a medium-sized substituent at the chiral center of the alc. moiety in the rate-detg. breakdown of a tetrahedral intermediate in the acylation of the enzyme and that the catalytic site of AES has the characteristics of the penicillin-recognizing enzymes in which Ser 59 in the consensus motif Ser-X-X-Lys plays a vital role as a nucleophile during acylation and Lys 62 acts as a general base.

L25 ANSWER 12 OF 32 CA COPYRIGHT 2002 ACS
AN 128:214345 CA
TI Identifying proteins with ***insecticidal*** activity: use of encoding genes to produce insect-resistant transgenic crops
AU Gatehouse, Angharad M. R.; Gatehouse, John A.
CS Dep. Biological Sci., Univ. Durham, Durham, DH1 3LE, UK
SO Pesticide Science (1998), 52(2), 165-175
CODEN: PSSCBG; ISSN: 0031-613X
PB John Wiley & Sons Ltd.
DT Journal; ***General Review***
LA ***English***
AB A review with 84 refs. Different classes of plant proteins have been shown to be insecticidal towards a range of economically important insect pests from different orders; in some cases a role in the defense of specific plant species against phytophagous insects has been demonstrated. Genes encoding insecticidal proteins have been isolated from various plant species and transferred to crops by genetic engineering. Amongst these genes are those that encode inhibitors of ***proteases*** (serine and cysteine) and .alpha.-amylase, lectins, and enzymes such as chitinases and lipoxygenases. Examples of genetically engineered crops expressing insecticidal plant proteins from different plant species, with enhanced resistance to one or more insect pests from Lepidoptera, Homoptera and

Coleoptera, are presented. The possibility of 'pyramiding' different resistance genes to improve the effectiveness of protection and durability is discussed and exemplified. The no. of different crop species expressing such genes is very diverse and ever-increasing. The viability of this approach to crop protection is considered.

L25 ANSWER 13 OF 32 CA COPYRIGHT 2002 ACS
AN 127:91386 CA
TI Cell culture models of interspecies selectivity to organophosphorus ***insecticides***
AU Veronesi, Bellina; Ehrich, Marion; Blusztajn, Jan Krzysztof; Oortgiesen, Marga; Durham, Heather
CS National Health Effects and Environmental Research Laboratories, Neurotoxicology Division, RTP, U.S. Environmental Protection Agency, Cellular and Molecular Toxicology Branch, NC, 27711, USA
SO Neurotoxicology (1997), 18(1), 283-298
CODEN: NRTXDN; ISSN: 0161-813X
PB Intox Press, Inc.
DT Journal; ***General Review***
LA ***English***
AB A review and discussion with many refs. In toxicol., the need to reduce uncertainties in human risk assessment is met by understanding why species and individuals within that species respond differently to chem. exposure. This kind of information is needed when extrapolating data from exptl. (i.e., whole animal) systems to the human condition in terms of risk assessment. In 1993 the Neurotoxicol. Division of the Environmental Protection Agency funded several investigators to examine this phenomenon (i.e., interspecies selectivity) using cell culture models. Organophosphorus (OP) insecticides were examd. since they are characterized by an extremely divergent interspecies response. In 1995, a symposium entitled Novel Insights into Chem. Neurotoxicity, sponsored by the Society for In Vitro Biol. featured this research. In it, a historical overview of the phenomenon of interspecies selectivity to OP insecticides was given, current explanations for it were discussed and contemporary in vitro models being used to explain it, were described. Data from these studies have helped to redefine the underlying mechanisms that characterize and influence the cross-species response to insecticides. These expts. have refocused the explanation of this phenomenon to include cellular metab., target enzyme baseline activities, and receptor-mediated electrophysiol. and second-messenger events. Several investigators on this panel also reported on the use of subcellular markers (e.g., target ***esterases*** , second messengers, ionic fluxes) to differentiate neuropathy-causing OP compds. from acetylcholinesterase inhibitors. After these presentations, tech. considerations used in the design of in vitro neurotoxicity studies were

discussed.

L25 ANSWER 14 OF 32 CA COPYRIGHT 2002 ACS
AN 125:268008 CA
TI Single versus multiple origins of ***insecticide*** resistance: inferences from the cyclodiene resistance gene Rdl
AU ffrench-Constant, Richard H.; Anthony, Nicola M.; Andreev, Dmitri; Aronstein, Kate
CS Dep. Entomology, Univ. Wisconsin, Madison, WI, 53706, USA
SO ACS Symposium Series (1996), 645(Molecular Genetics and Evolution of Pesticide Resistance), 106-116
CODEN: ACSMC8; ISSN: 0097-6156
PB American Chemical Society
DT Journal; ***General Review***
LA ***English***
AB A review, with 35 refs. The no. of independent origins of insecticide resistance alleles is currently the subject of intense debate. Support for the importance of a single point of origin and spread of resistance through insect populations comes from studies of amplified ***esterases*** and insensitive acetylcholinesterase in Culex mosquitoes. Here we argue that it is difficult to det. precisely the no. of origins of resistance alleles due to the complexity of the two mechanisms studied in Culex. The repeated replacement of the same amino acid in the Resistance to dieldrin (Rdl) gene, conferring resistance to cyclodiene insecticides, offers a model system within which to examine the diversity and origins of resistance alleles. By comparing Rdl alleles in two Drosophila species, two beetle species and the Bemisia tabaci whitefly complex we present repeated evidence for multiple independent origins of resistance. Evidence for independent origins comes not only from the finding of different replacements of this same amino acid but also flanking sequence data supporting multiple origins of the same amino acid replacement. Further, we emphasize that the life history of the insect under consideration can play a major role in detg. the likely origin and spread of different resistance alleles.

L25 ANSWER 15 OF 32 CA COPYRIGHT 2002 ACS
AN 125:268007 CA
TI Evolution of ***insecticide*** resistance in the mosquito Culex pipiens: the migration hypothesis of amplified ***esterase*** genes
AU Raymond, M.; Pasteur, N.
CS Lab. Genetique Environ., Inst. des Sci. l'Evolution, Montpellier, F-34095, Fr.
SO ACS Symposium Series (1996), 645(Molecular Genetics and Evolution of Pesticide Resistance), 90-96
CODEN: ACSMC8; ISSN: 0097-6156

PB American Chemical Society
DT Journal; ***General Review***
LA ***English***
AB A review, with 26 refs. Resistance to organophosphorus insecticides has been studied at the gene and the population levels in Culex pipiens in various geog. areas. Only three loci have developed major resistance alleles in this species, including Est-2 (or ***esterase*** B), at which resistance occurs through gene amplification. Gene amplification involving a same particular haplotype has been found at the ***esterase*** B locus of mosquitoes from various continents. This situation, which has been explained by a unique amplification event followed by migration and selection by OP insecticides, has been sometimes questioned. A clarification of the hypotheses proposed is presented, and how it is possible to prove or disprove them. Recent data on the extent of polymorphism at the ***esterase*** B locus in susceptible populations provide a strong support of the migration hypothesis.

L25 ANSWER 16 OF 32 CA COPYRIGHT 2002 ACS
AN 125:268006 CA
TI Expression of amplified ***esterase*** genes in ***insecticide*** -resistant Myzus persicae (Sulzer)
AU Field, Linda M.; Hick, Caroline A.; Devonshire, Alan L.; Javed, Naghmy; Spence, Jennifer M.; Blackman, Roger L.
CS Biol. Ecological Chem. Dep., Inst. Arable Corps Res.-Rothamsted, Harpenden, Hertfordshire, AL5 2JQ, UK
SO ACS Symposium Series (1996), 645(Molecular Genetics and Evolution of Pesticide Resistance), 72-78
CODEN: ACSMC8; ISSN: 0097-6156
PB American Chemical Society
DT Journal; ***General Review***
LA ***English***
AB A review with 13 refs. Insecticide resistance in Myzus persicae results from amplification of genes encoding insecticide-detoxifying ***esterases*** and from differential transcription of the amplified genes which may be mediated by changes in DNA methylation. Methylation is usually stable in resistant aphid clones and can be inherited during sexual reprodn. However, when a sudden loss of methylation occurs within a clone, it is accompanied by silencing of the amplified genes. When reselected with insecticides some recovery of expression can occur but this is not accompanied by methylation. Some aphid clones have amplified ***esterase*** genes arranged as tandem repeats at a single locus, whereas others have arrays dispersed around the genome. Thus, although resistance in M. persicae is dependent primarily on gene amplification, this may be modulated by other mol. and genetic factors.

L25 ANSWER 17 OF 32 CA COPYRIGHT 2002 ACS
AN 124:168119 CA
TI Molecular biology of ***insecticide*** resistance
AU Feyereisen, R.
CS Department of Entomology, Forbes 410, University of Arizona, Tucson, AZ, 85721, USA
SO Toxicol. Lett. (1995), 82/83(1-6), 83-90
CODEN: TOLED5; ISSN: 0378-4274
DT Journal; ***General Review***
LA ***English***
AB A review with 18 refs. The widespread use of insecticides has amounted to a large scale 'expt.' in natural selection of insects by chems. of toxicol. importance to humans. Specific examples in which the mol. basis of insecticide resistance has been studied in detail are presented here. The biochem./physiol. mechanisms of resistance can be categorized as target site insensitivity, increased metabolic detoxification and sequestration or lowered availability of the toxicant. These are achieved at the mol. level by: point mutations in the ion channel portion of a GABA receptor subunit (cyclodiene insecticides); point mutations in the vicinity of the acetylcholinesterase (AChE) active site (organophosphorus and carbamate insecticide resistance); amplification of ***esterase*** genes (organophosphorus and carbamate insecticides); mutations linked genetically to a sodium channel gene (DDT and pyrethroid insecticides); and yet uncharacterized mutations leading to the up-regulation of detoxification enzymes, such as cytochrome P 450 and glutathione S-transferases (many classes of insecticides). In several cases, the selection of a precisely homologous mutation has been obsd. in different insect species.

L25 ANSWER 18 OF 32 CA COPYRIGHT 2002 ACS
AN 124:109001 CA
TI Biochemical mechanisms contributing to species differences in ***insecticidal*** toxicity
AU Chambers, Janice E.; Carr, Russell L.
CS Center for Environmental Health Sciences, College of Veterinary Medicine, Mississippi State University, Box 9825, Mississippi State, MS, 39762-9825, USA
SO Toxicology (1995), 105(2,3), 291-304
CODEN: TXCYAC; ISSN: 0300-483X
DT Journal; ***General Review***
LA ***English***
AB A review with 48 refs. Comparison of published LD50 or LC50 levels for a variety of insecticides in several vertebrate species indicate that a wide range of toxicity levels exist, and these cannot be easily predicted within either a chem. group or within a species. There is a relatively

limited data base documenting interactions between insecticides and other chems., either agricultural or non-agricultural; however, the fact that all major insecticide groups perturb nervous system function as their primary mechanism of acute toxicity suggests the potential for interactions. Studies in our labs. on a select group of phosphorothionate insecticides in rats indicated that brain acetylcholinesterase sensitivity to inhibition by the oxons, the active metabolites of the phosphorothionates, does not correlate with acute toxicity levels. The activities and properties of hepatic cytochrome P 450-mediated activation (desulfuration) and detoxication (dearylation) of the phosphorothionates as well as of A- ***esterase*** -mediated hydrolysis of oxons contribute substantially to understanding the acute toxicity levels in rats, as does the sensitivity of the protective aliesterases to phosphorylation. However, in the channel catfish, the acetylcholinesterase sensitivity to oxon inhibition reflects the acute toxicity level of these same insecticides, and may be largely responsible for detg. the acute toxicity level in this species. Thus, metab. of insecticides appears to be far more influential in some species than others in detg. the toxicity elicited.

L25 ANSWER 19 OF 32 CA COPYRIGHT 2002 ACS
AN 123:308547 CA
TI Development and testing of genetically improved baculovirus ***insecticides***
AU Wood, H. Alan
CS Boyce Thompson Institute Plant Research, Cornell University, Ithaca, NY, 14853, USA
SO Baculovirus Expression Syst. Biopestic. (1995), 91-102. Editor(s): Shuler, Michael L. Publisher: Wiley-Liss, New York, N. Y. CODEN: 61LQAG
DT Conference; ***General Review***
LA ***English***
AB A review and discussion with 44 refs. Discussed are the Buthus eupeus Insectotoxin-1, Androctonus australis AsIT toxin, Pyemotes tritici neurotoxin Tox-34, Bacillus thuringiensis delta-endotoxin, Manduca sexta diuretic hormone, Heliothis virescens juvenile hormone ***esterase*** , ecdysteroid UDP-glucosyl transferase, and other pesticidal gene products.

L25 ANSWER 20 OF 32 CA COPYRIGHT 2002 ACS
AN 120:291957 CA
TI Detection methodology of ***esterase*** -mediated ***insecticide*** resistance: from bioassay to biotechnology
AU Abdel-Aal, Yehia A. I.; Ibrahim, Sanaa A.; Lampert, Emmett P.; Rock, George C.
CS Coll. Agric., Assiut Univ., Assiut, Egypt

SO Rev. Pestic. Toxicol. (1993), 2, 13-33
CODEN: RPETEZ; ISSN: 1062-3965
DT Journal; ***General Review***
LA ***English***
AB A review with 120 refs.

L25 ANSWER 21 OF 32 CA COPYRIGHT 2002 ACS
AN 119:22681 CA
TI ***Insecticidal*** bacterial proteins identify the midgut epithelium as a source of novel target sites for insect control
AU Federici, Brian A.
CS Dep. Entomol., Univ. California, Riverside, CA, 92521, USA
SO Arch. Insect Biochem. Physiol. (1993), 22(3-4), 357-71
CODEN: AIBPEA; ISSN: 0739-4462
DT Journal; ***General Review***
LA ***English***
AB A review with 44 refs. of the spore-forming bacterium, Bacillus thuringiensis (Bt), which produces a cryst. parasporal body during sporulation, which in many subspecies contains one or more proteins selectively toxic to insect midgut epithelia. Most of these proteins are protoxins with a mol. mass of about 133,000. When ingested by a susceptible insect, the inclusions dissolve in the midgut juices and are activated by proteolytic cleavage, which releases a toxic peptide of about 65,000. In susceptible insects, this peptide binds to sites on the microvillar membrane, causing cytolysis, apparently by forming transmembrane pores. The cytolysis of midgut cells results in paralysis and subsequent death of the insect. Though less common, naturally truncated protein toxins with masses of about 70,000 also occur. Three major pathotypes of Bt proteins are known: CryI and CryII proteins toxic primarily to lepidopterous insects, CryIII proteins toxic to coleopterous insects, and CryIV proteins toxic to dipterous insects. The genes encoding more than 50 Bt crystal proteins have been coned and sequenced and several of these have already been used to construct recombinant microbial insecticides and transgenic organisms including viruses, algae, and insect-resistant plants. Anal. of Bt genes indicate that the protein toxins they encode consist of at least two functional domains: a series of five blocks of conserved amino acids that comprise the structural core of the mol. including the putative toxic moiety, and a hypervariable region mol. including the putative toxic moiety, and a hypervariable region thought to define the spectrum of activity. Detn. of the mode of action at the mol. level and the genetic basis for insect specificity should enable recombinant DNA technol. to be used to expand the insect host range of Bt as well as increase its toxicity against insects. Moreover, the high toxicity and specificity of the insecticidal proteins produced by Bt and their action on midgut microvilli suggest that other types of peptides